NAVSHIPS 93032

sierra

WATTMETER ME-125/U

SIERRA ELECTRONIC CORPORATION

TEMPORARY CORRECTION T-1 TO TECHNICAL MANUAL FOR WATTMETER ME-125/U NAVSHIPS 93032

This temporary correction is in effect at the time of shipment of the equipments from the factory. Therefore, the manual is to be corrected upon receipt of this temporary correction.

This temporary correction changes the manual to reflect equipment changes made during production and applies to all sets, serial numbers 1 through 126 inclusive. The purpose of the changes has been to improve the physical and electrical characteristics of the ME-125/U.

Make the following pen and ink corrections. Insert this temporary correction in the technical manual immediately after the front cover.

PAGE NO	LINE NO	ACTION
8	17	Change "50 ohms, ±2% 75 watts 2.5 ohm tap 75X8 Sierra SP-8430-1" to "50 ohms, ±2% 75 watts in air 1.6 ohm tap SU-8893-2 Sierra "
9	5	Change "±10%" to "±5%"
9	15	Change"GB" to "HB"
12	12&13	Change "75 watts, glass body, 9 in. long" to "1.6 ohm tap, 75 watts in air, ceramic body, 9 in. long, .810 in. diameter, includes resistor-contact assembly"
14	1	Change "COMPOSITION, 15,000 ohms, 10%, 1 watt" to "WIREWOUND, 15,000 ohms, 5%, 5 watts"
14	19	Change "1 watt" to "2 watts"
17	15	Change "Mounted in Part No. 30" to "Part of Diode Mount Assembly"
18	1	Change "497c.c. " to "675 c.c."
18	4	Change "solid black rubber," to "selastic rubber,"
18	5	Change "4-5/8 in. long" to "11/16 in. long"

PAGE NO	LINE NO	ACTION
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18	13	Change " N6625-575-6138" to " For Reference Only"
18	13	Change "CONTACT, electrical, resistor, material, brass, 3/8 in. long, .62 in. dia." to "CONTACT, electrical, resistor, integral part of R1"
19	9	Change " solid black rubber" to "selastic rubber"
19	14	Change "27/32 in. dia." to "3/4 in. dia."

31 October 1958

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AVSHIPS 93032

INSTRUCTION MANUAL

PEAK-READING TERMINATION WATTMETER

Model 195A-U

Serial Numbers 1-126

WATTMETER ME-125/U

Manufactured by

SIERRA ELECTRONIC CORPORATION
A Subsidiary of Philco Corporation
3885 Bohannon Drive
Menlo Park, California

WARRANTY

SIERRA ELECTRONIC CORPORATION warrants instruments manufactured by it and bearing Sierra commercial model numbers, except Ion Gauge Tubes, to be free from defective material and factory workmanship and agrees to repair such instruments, which under normal use and service, disclose the defect to be the fault of our manufacturing. Our obligation under this warranty is limited to repairing any such instrument which in our sole opinion upon our examination proves to be so defective, when returned to our factory, transportation prepaid by the purchaser, within one year from the date of original purchase from us.

This warranty does not apply to any of our products which have been repaired, worked upon or altered by persons not authorized by us so as, in our sole judgement, to injure the stability or reliability of such instrument, or which have been subject to misuse, negligence or accident, or the serial number of which has been altered, effaced, or removed. Neither does this warranty apply to any of our products which have been connected, installed, used or adjusted otherwise than in accordance with the instructions furnished by us. Nor does SIERRA ELECTRONIC CORPORATION assume any liability for consequential damages, and in any event our liability shall in no case exceed the original purchase price of the instrument. Accessories, including but not limited to all vacuum tubes, fuses and batteries, not of our manufacture used with this product are not covered by this warranty.

SIERRA ELECTRONIC CORPORATION reserves the right to make changes in the design or construction of any of its instruments at any time without incurring any obligation to make any changes whatever on units previously purchased.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to represent nor assume for us any liability in connection with the sale of our products other than that set forth herein.

SCI-195
July 18, 1956

SUMMARY OF TECHNICAL SPECIFICATIONS

Peak Power Ranges	5 and 15 kilowatts full scale, direct reading
Pulse Width	3.0 to 5.0 microseconds
Repetition Rate	300 to 7200 pulses per second
Accuracy	±10% of full scale
Frequency Range	450 mc/s to 1250 mc/s
Impedance	50 ohms
VSWR	Less than 1.2
Maximum Average Power	500 watts
Connector	Type HN female
Power	105-125 volts rms, 50/60 cps, single phase, 35 watts
Overall Dimensions	Length: 23-1/4 inches Width: 6 inches Height: 8 inches
Weight	Approximately 35 pounds

OPERATING INSTRUCTIONS

for

PEAK-READING TERMINATION WATTMETER
MODEL 195A-U

1. GENERAL

The Sierra Model 195A-U Termination Wattmeter is designed to measure peak r-f power in the frequency range from 450 mc to 1250 mc. The unit is ruggedly constructed, which makes it useful for field application as well as laboratory service, especially where accuracy, low VSWR and high stability are important.

The wattmeter provides two full-scale peak power ranges, 0-5 kw and 0-15 kw. The units can also be operated as a dummy load at the full rating of 500 watts average continuous power up to frequencies of 1500 mc, due to the very low VSWR inherent in the design. The normal impedance of the Model 195A-U is 50 ohms.

2. DESCRIPTION

The Model 195A-U is composed of a power-dissipating structure (dummy load), a power-sampling device and a metering section. The power-dissipating element is a coaxial terminating resistor housed in a finned structure which is constructed of aluminum to minimize weight.

The basic sections of the unit are described below:

(a) Dissipative element (Coaxial Terminating Resistor): The Model 195A-U employs a 50 ohm cylindrical resistive center conductor which is held in a special tapered coaxial mount that has been designed to produce low VSWR characteristics. The resistive element is a highly-stable metallic film on an insulating tube. The resistor is immersed in a liquid dielectric coolant, which rapidly transfers the heat dissipated in the resistive film to the outer walls and external heat-radiating fins of the structure.

(b) Power Sampling Device: The Model 195A-U employs a straightforward method of measuring the peak r-f power absorbed by the termination. This consists of measuring the peak r-f voltage applied to the termination resistor by means of measurement of the corresponding peak r-f voltage developed across a resistive tap located near the ground end of the termination. The tapped peak r-f voltage is applied to a thermionic diode followed by a very high resistance load by passed with a large storage

capacitor. This yields a d-c output voltage from the diode which is proportional to the peak r-f voltage applied to the coaxial input connector. This d-c voltage is applied to a very high impedance vacuum-tube voltmeter unit which is calibrated directly in kilowatts. The high-impedance metering unit together with the large storage capacitor causes the instrument reading to be essentially independent of duty cycle of the pulsed r-f input signal over the range of 3 usec to 5 usec pulse width and 300 pps to 7200 pps repetition rate.

A power range selector switch is provided on the front panel to select the correct VTVM sensitivity to give full-scale peak power values of 5 and 15 kw.

(c) Metering Section: Schematic Diagram E-8591-2 and associated parts list show the circuit elements comprising the Model 195A-U Peak-Reading Termination Wattmeter. Resistor R1 is the tapped coaxial termination resistor, and vacuum tube V3 is the diode detector mounted within the termination resistor assembly near its grounded end. The parallel combination of capacitors C1 and C2 in conjunction with the series combination of resistors R3, R4 and R5 results in a long-time-constant, high-resistance load for the diode detector. This insures that the resultant rectified d-c output voltage from the diode will be substantially equal to the peak value of the r-f signal applied thereto. A calculated fraction of the diode d-c output voltage is selected by means of the RANGE switch and applied to the direct-coupled, balanced d-c amplifier tubes V1 and V2 and thence to indicating meter M1, which is calibrated directly in terms of peak kilowatts of r-f power applied to the coaxial termination resistor. Ballast resistor RT1 regulates the filament current of diode V3 so that its contact potential is maintained substantially constant against changes in power line voltage. Potentiometer R22 provides a small adjustable compensating voltage which is used to "buck out" the residual contact potential effect from the diode under conditions of no applied r-f input signal, thus insuring that the meter measures only the diode rectifier output voltage due to applied r-f power.

Voltage regulating tube V4 furnishes constant anode potential to high-gain amplifier tube V1, thus insuring stable gain of the d-c amplifier stage against variations in power line voltage. Tube V2 functions as a cathode follower and hence requires no such stabilization of anode supply. Resistor R18 (sensitivity) is adjustable to permit calibrating the absolute response of the 195A-U Wattmeter against an external source of known peak power.

3. OPERATION

The following procedure is suggested for operation of the 195A-U Peak Reading Termination Wattmeter for optimum results and to insure against possible overload of the metering circuit.

(a) Turn off the r-f power from the transmitter or source under test.

(b) Connect the Model 195A-U to the proper mating r-f connector from the source.

Note: The Model 195A-U mates with a type HN male connector. If an adaptor of improper design is used to adapt this termination wattmeter to another connector system, the inherent low VSWR characteristics of the termination wattmeter may not be realized.

(c) Plug the line cord connector of the Model 195A-U into a suitable outlet. Turn instrument on by placing the RANGE switch in the 15-kw position. Allow 10 minutes for warmup, and then adjust the ZERO knob for a meter reading of zero.

(d) Apply the r-f power, but not in excess of the maximum rating of the wattmeter.

(e) Advance the RANGE switch to the 5-kw position if increased sensitivity is required. Avoid overloading the instrument beyond the full scale value to prevent possible damage to the meter circuit.

(f) The power reading observed is the peak r-f power being delivered to the termination resistor. Normal room ventilation is all that is required to operate the wattmeter continuously up to 500 watts average power at ambient temperatures of up to 25°C. Do not confine the unit, as this may restrict the natural convection cooling required for proper operation of this instrument.

For ambient temperatures above 25°C, the power dissipation derating curve shown on attached drawing SP - 8962-1 must be applied.

CAUTION: The Model 195A-U Wattmeter must be operated in its normal horizontal position to achieve the specified performance.

WAVEFORM ERRORS

The Termination Wattmeter uses a peak-responding type of detector and metering circuit which is calibrated on the basis of fundamental sinusoidal r-f waveform. It is therefore possible to obtain measurement errors in the presence of non-sinusoidal waveforms. These errors are the same as those associated with any peak-

responding detector when the r-f waveform is distorted by the presence of harmonics. One method of improving a distorted waveform is to use a suitable low pass filter designed to discriminate against the harmonics, inserted between the r-f source and the wattmeter.

4. MAINTENANCE

A. Calibration Procedure

The Model 195A-U Peak Reading Termination Wattmeter is normally supplied from the factory with all adjustments and calibrations made to yield the specified performance characteristics. Should it be found necessary to conduct a recalibration of the instrument, the following procedure should be employed.

1. Detach the metering box from the finned load housing by removing the flat head screw on the under side of the load bracket nearest the metering box. This permits the metering box to be lifted upward and off the studs on the load which engage the keyhole mounts in the metering box, and the two units may then be separated by a short distance without disconnecting their interconnecting cable.

2. With the power plug connected to a suitable outlet, place the RANGE switch in the 15 kw position and allow 10 minutes warmup.

3. Using a short clip-lead, ground the white cable lead (terminal block on face of finned load housing). Using a small screwdriver, rotate the COMP. control R22 (located at rear of metering box) full clockwise to place its rotor contact at ground. Then adjust the ZERO knob on the front panel to obtain a reading of "0" on the panel meter.

4. Remove clip-lead and adjust COMP. control to restore "0" reading of panel meter. Place RANGE switch in the 1 kw position and verify that panel meter reading is still substantially "0" (within ± 1/32 inch). This complete the "balancing up" process of the diode and amplifier combination.

5. To calibrate the wattmeter for absolute level connect the input to a pulsed r-f signal source operating at a frequency near the center of the specified operating frequency range of the instrument. The pulse output should be approximately 3 microseconds long with a repetition rate of about 1000 pulses per second.

The pulsed power signal should be set up to deliver a known amount of peak power. The following procedure can be used to determine the peak power output, used for calibration.

(a) Equipment (set up in accordance with Figure 1)

(1) Pulse power source (URN-3 or equivalent)
(2) Low pass filter (Sierra Model 284A-1400 HN)
(3) Directional Coupler specified for this frequency range and calibrated for coupling factor accuracy (Sierra Model 137A)
(4) Crystal detector (Sierra Model 148 or HP 420A)
(5) Oscilloscope (Tektronix 511 or equivalent)
(6) Power Meter (HP 430B Power Meter)
(7) Thermistor mount (HP 477A) or Bolometer mount HP 476A (or equivalent)

(b) With this equipment a measurement of average power is obtainable.

Example: (Follow the diagram in Figure 1.)

Assume coupling factor of the Directional Coupler is 40 db at the operating r-f frequency. And also assume the power meter reads 3 milliwatts when connected to the Directional Coupler, the average power in the primary line (that going to the load) is 40 db above 3 milliwatts, or 10,000 times greater. (40 db= 10,000:1 power ratio). Therefore, the average power is 3 milliwatts X 10,000 = 30 watts.

(c) With the known average power the peak power can be calculated with the following formula:

$$\text{peak power} = \frac{\text{average power}}{\text{duty cycle}}$$

Where: duty cycle = Pulse length X Pulse Repetition Freq.

Note: The pulse length must be the equivalent rectangular pulse length as determined by the crystal detector and oscilloscope. Usually the pulse length at 70% amplitude is considered the equivalent rectangular length.

Example:

Equivalent rectangular pulse length - 3 microseconds.
Pulse repetition frequency - 1000 pps

$$\text{duty cycle} - 3X10^{-6} X1000 = .003$$

Therefore:

$$\text{Peak power} = \frac{30 \text{ Watts (average power)}}{.003}$$

$$= 10,000 \text{ watt peak}$$

Refer to Figure 1 for Calibration Test Set-up.

(d) Set the RANGE switch of the Wattmeter to the position which is most consistent with the determined value of peak r-f power and adjust the SENS. control to obtain a meter reading that agrees with the known input power. The calibration can be rechecked at various other power levels.

This completes the calibration process and the unit may now be reassembled.

NOTE:

(1) It is not usually necessary to check the VSWR after reassembly with a new diode since the VSWR is determined by the value of the load resistor only.

(2) Since the diode in this wattmeter is used as a peak rectifier operating into a high impedance load, the diode characteristics are not critical in the operation of the unit.

B. Diode Replacement

Should it be necessary to replace the vacuum-tube diode V3, the following procedure should be employed.

1. Detach the metering box from the load as described in 4.A.1 above.

2. With the load securely positioned so that its coaxial connector faces straight downward, to avoid spilling oil, remove the four fastening screws from the "top-hat" housing which encases the ground end of the load resistor, making sure to first unscrew from the barrier terminal strip the three solder lugs on the ends of the leads of the "top-hat" houseing. Lay the "top-hat" alongside the opening it covers, being careful not to strain the internal connecting wires nor to spill any oil from the interior of the exposed load assembly.

3. Carefully unplug the small tube socket connector from the end of the diode. Referring to attached diagram SU-8672-2, follow in reverse the procedure diagrammed thereon to remove the diode and its associated mounting and contact assembly from the load.

4. Substitute replacement diode, using the procedure steps in the order given on drawing SU-8672-2. If any oil is spilled in the above steps it will be necessary to completely drain out the remaining oil from the unit, measure off exactly 675 cc of oil (Dow Corning DC-200 Silicone Oil 1.5 centistoke viscosity) and refill the unit with this amount. Replace "top-hat" housing and connecting wires to their original locations. The diode replacement is now complete and the instrument should now be completely recalibrated in accordance with the procedure given in 4.A.

C. Replacement of Other Tubes or Components

Access to the components within the metering box may be gained by removing three screws from the front (panel) face of the instrument, namely the two screws above each side of the meter and the one screw in the "hand-hold" recess below the pilot light. This permits removal of the front face casting and the perforated wrap-around, which then affords complete access to all components within the box. Replacement of tubes or components may require recalibration in accordance with the procedure given in 4.A.

Schem. Ref. No.	Description	Sierra Stock No.	Mfgr.	Designation
C1	Approx. 400 mmf, made as part of diode mount. Listed for reference.	SU-8603-2	Sierra	
C2	Mica, 0.0082 mfd ±20% 300Vdcw	16M822	El-Menco	CM35B822M
C3	Dur-Mica, 390 mfd ±10% 500Vdcw	19K391	El-Menco	DM15-391K
C4A	Dur-Mica, 0.005 mfd ±10% 300Vdcw	19K502	El-Menco	DM20-502K
C5	Dur-Mica, 0.005 mfd ±10% 300Vdcw	19K502	El-Menco	DM20-502K
C6	Electrolytic, 4 mfd 450Vdcw	22X405	Cornell Dubilier	BR-445
C7	Ceramic, two-section, 0.02 mfd, ±20% 500Vdcw	14A203	Sprague	5HK252
CR1	Rectifier, selenium, 50 ma	104X3	Int. Rectifier Corp.	61-2729
CR2	Rectifier, selenium, 50 ma	104X3	Int. Rectifier Corp.	61-2729
CR3	Rectifier, selenium, 50 ma	104X3	Int. Rectifier Corp.	61-2729
CR4	Rectifier, selenium, 50 ma	104X3	Int. Rectifier Corp.	61-2729
F1	Fuse, 1 amp., 250V	132X6	Littelfuse	312001
I1	Pilot lamp socket with bulb	142X13	Hetherington	L6002-R
M1	0-1 ma, 45 ohms, with special scale	118X12	Simpson	Mod. 25
R1	50 ohms, ±2%, 75 watts, 2.5 ohm tap	75X8	Sierra	SP-8430-1
R2	300 megohm, ±1%, 2 watt	78X2	Dale Prod.	DC-2
R3	300 megohm, ±1%, 2 watt	78X2	Dale Prod.	DC-2
R4A	7.32 megohm, ±1%, 1/2 watt, type DCC	74X38	I.R.C.	DCC
R5A	10 megohm, ±1%, 1/2 watt	74X39	I.R.C.	DCC
R6	5.6 megohm, ±10%, 1/2 watt	52X565	AB	EB
R7	3.9 megohm, ±5%, 1/2 watt	50X395	AB	EB
R8	3.9 megohm, ±5%, 1/2 watt	50X395	AB	EB
R9	470,000 ohms, ±5%, 1/2 watt	50X474	AB	EB
R10	470,000 ohms, ±5%, 1/2 watt	50X474	AB	EB
R11	12 megohm, ±10%, 1/2 watt	52X126	AB	EB
R12	680 ohm, ±5%, 1/2 watt	50X681	AB	EB

Electrical Parts List for Schematic Diagram No. E-8591-2
Model 195A-U

Schem. Ref. No.	Description	Sierra Stock No.	Mfgr.	Designation
R13	680 ohm, ±5%, 1/2 watt	50X681	AB	EB
R14	270 ohm, ±5%, 1/2 watt	50X271	AB	EB
R15	270 ohm, ±5%, 1/2 watt	50X271	AB	EB
R16	250 ohm, ±10%, 2 watt comp. pot	79X32	Ohmite	CU-2511
R17	15,000 ohm, ±10%, 5 watt	62X153	Sprague	#27E
R18	2500 ohm, ±10%, 2 watt comp. pot	79X12	Ohmite	CLU2521
R19	4000 ohm, ±5%, 5 watt wire wound	62A402	Sprague	27-E
R20	2700 ohm, ±5%, 1/2 watt	50X272	AB	EB
R21A	2700 ohm, ±5%, 1/2 watt	50X222	AB	EB
R22	500 ohm, ±10%, 2 watt comp. pot	79X20	Ohmite	CLU 5011
R23A	4700 ohm, ±5%, 1/2 watt	50X562	AB	EB
R24	4000 ohm, ±5%, 5 watt wire wound	62A402	Sprague	27-E
R25	10 ohm, ±10%, 2 watt	60X100	AB	HB
R26	15 ohm, ±10%, 1 watt	56X150	AB	GB
R27A	36 ohm, ±5%, 2 watt	58X360	AB	GB
RTA	2HT4 Ballast tube, 250 ma current	58X360	Amperite	2HT4
S1	Switch, rotary 3 position, 1 section plus AC switch last CW position off	112X24	Oak	FC type
T1	Transformer, plate and filament 117V a-c 60 cps primary	100X11	PAECO	
V1	Electron tube, 12AU7 twin triode	107X12AU7		
V2	Electron tube, 12AU7 twin triode	107X12AU7		
V3	Electron tube, 6173 UHF pencil type diode	107X6173	RCA	
V4	Electron tube, OB2 voltage regulator	107XOB2		
XF1	Fuse holder	134X1	Littelfuse	342003
XI1	Lamp socket (See I1)	142X13	Hetherington	L6002-R
XRT1	Tube socket, 7 pin miniature with shield base and shield	140X6/168X5	Cinch	7XC/7S4
XV1	Tube socket, 9 pin miniature with shield base and shield	140X11/168X9	Cinch	9XC/9S2

Electrical Parts List for

Schematic Diagram No. E-8591-2
Model 195A-U

Schem. Ref. No.	Description	Sierra Stock No.	Mfgr.	Designation
XV2	Tube socket, 9 pin miniature with shield base and shield	140X11/168X9	Cinch	9XC/9S2
XV3	Tube socket, 2 pin sub miniature	140X15	Cinch	54A16325
XV4	Tube socket, 7 pin miniature with shield base and shield	140X6/168X5	Cinch	7XC/7S4

Electrical Parts List for

Schematic Diagram No. E-8591-2
Model 195A-U

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS, NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTIONS
C1	For Reference Only	CAPACITOR, FIXED, PLASTIC DIELECTRIC, 1 section, 400 mmf 5500V peak, No. 56 scotch electrical tape wound on diode bushing 1.187 in. long, .806 in. diameter	V3RF Bypass
C2	N5910-666-6752	CAPACITOR, FIXED, MICA DIELECTRIC, 1 section, .0082 mfd, ±20%, 300V dc, plastic case 1-3/16 inch long, 11/32 inch deep, 13/16 inch high Unshielded wire lead type	DC Storage
C3	N5910-101-4909	CAPACITOR, FIXED, MICA DIELECTRIC, 1 section, 390 mmf ± 10%, 500V dc, plastic case, 7/16 inch wide, 7/32 inch deep, 11/32 inch high, uninsulated wire lead type	Bypass
C4A	N5910-184-5747	CAPACITOR, FIXED, MICA DIELECTRIC, 1 section, .005 mfd, ±10% 300 V dc, plastic case, 23/32 inch wide, 7/32 inch deep, 15/32 inch high, uninsulated wire lead type	Bypass
C5		Same as C4	
C6	N5910-195-0276	CAPACITOR, FIXED, ELECTROLYTIC, 1 section, 4 mfd, 450V dc, hermetically sealed insulated case 5/8 inch diameter, 1-7/16 inch long uninsulated wire lead type	Filter
C7	N5910-543-0899	CAPACITOR, FIXED, CERAMIC DIELECTRIC, 2 section, 20,000 mmf each section ±20%, 500V dc each section, insulated body button type, uninsulated wire lead type	Line Bypass
CR1	N6130-591-2745	RECTIFIER, METALLIC, SELENIUM, single phase full wave type, input 275V ac output through filter, 325 V dc, 50 ma max current rating 11/16 inch high one 3/16 inch mounting hole through center solder lug type	Power Supply
CR2		Same as CR1	

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS, NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTIONS
CR3		Same as CR1	
CR4		Same as CR1	
F1	G5920-280-4465	FUSE, CARTRIDGE, 1 amp. 250 volt AC transparent body, ferrule type, 1-1/4 inch long, 1/4 inch diameter, 1/16 inch thick	Input Power Circuit
I1	N6210-553-1518	LIGHT, INDICATOR, 6.3V .25 amp Tungston filament, red lens black smooth body, bushing mounted, overall dimensions, 1-1/32 in. long, 1/2 in. wide, 1/2 in. high	pilot Light
M1	N6625-553-7589	AMMETER DC, 1 ma, basic movement, 0-5 kw upper scale, 0-15 kw lower scale, 45 ohms int. res. round plastic, panel mounting type, flange dia 3-1/2 in. body dia 2-3/4 in. overall depth 2-1/4 in. three mounting holes 1/8 in. dia spaced 120 degrees apart	Voltmeter
R1	N5905-552-5793	RESISTOR, FIXED, FILM, 50 ohms, ±2%, 75 watts, glass body, 9 in. long	Dissipating Element inside main body
R2A	N5905-553-9798	RESISTOR, FIXED, COMPOSITION, 300 megohms, ±1%, 2 watt, 2-1/6 in. long	Divider
R3	N5905-553-9798	RESISTOR, FIXED, FILM, 300 megohms, ±1%, 2 watts, varnish coated humidity resistant, 2-1/8 in. long, 2/164 in. dia axial wire lead type	Divider
R4A	N5905-279-2508	RESISTOR, FIXED, COMPOSITION, 7.32 megohms ±1%, 1/2 watt, insulated body, 3/8 inches long, 9/64 inches diameter, axial wire lead type	Divider
R5A	N5905-279-1865	RESISTOR, FIXED, COMPOSITION, 10 megohms, ±1%, 1/2 watt, insulated body, 3/8 inch long, 9/64 in. diameter, axial wire lead type	Divider

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS, NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTIONS
R6	N5905-279-3838	RESISTOR, FIXED COMPOSITION, 5.6 megohm, ±10% 1/2 watt Insulated body, 3/8 in. long, 9/64 in. diam. axial wire lead type	Series Dropping
R7	N5905-279-2510	RESISTOR, FIXED, COMPOSITION, 3.9 megohm, ±5%, 1/2 watt insulated body, 3/8 in. long, 9/64 in. diam. axial wire lead type	Plate
R8		Same as R7	
R9	N5905-279-2515	RESISTOR, FIXED COMPOSITION, 470,000 ohms, ±5%, 1/2 watt, insulated body, 3/8 in. long, 9/64 in. diam., axial wire lead type	Cathode V1
R10		Same as R9	
R11	N5905-279-2505	RESISTOR, FIXED COMPOSITION, 12 megohms, ±10% 1/2 watt insulated body, 3/8 in. long, 9/64 in. diam. uninsulated wire lead type	Cathode V1
R12	N5905-195-6791	RESISTOR, FIXED COMPOSITION, 680 ohms, ±5% 1/2 watt, insulated body, 3/8 in. long, 9/64 in. diam., uninsulated wire lead type	Cathode V2
R13		Same as R12	
R14	N5905-171-2006	RESISTOR, FIXED COMPOSITION, 270 ohms, ±5% 1/2 watt insulated body, 3/8 in. long, 9/64 in. diam. uninsulated wire lead type	Cathode V2
R15		Same as R14	
R16	N5905-279-1926	RESISTOR, VARIABLE, COMPOSITION, ELEMENT, 1 section, 250 ohms ±10%, 2 watt, STD. A taper, 3 solder lug terminals, metal case, 1 in. diam. bushing mounted	Balance

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS, NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTIONS
R17	N5905-299-2028	RESISTOR, FIXED, COMPOSITION, 15,000 ohms, 10%, 1 watt	Voltage Dropping
R18	N5905-107-6068	RESISTOR, VARIABLE, CARBON, element, 2500 ohms, 10%, 2 watt STD. A taper, 3 terminals	Sensitivity Control
R19	N5905-270-6279	RESISTOR, FIXED, WIREWOUND, 4000 ohms, 5%, 5 watt, enameled coating, wire lead type, 1-3/16 in. long	Voltage Divider
R20	N5905-279-1880	RESISTOR, FIXED, COMPOSITION, 2700 ohms, 5%, 1/2 watt, 3/8 in. long, wire lead type	Voltage Divider
R21A	5905-279-1880	RESISTOR, FIXED, COMPOSITION, 2700 ohms total resistance, 5%, 1/2 watt, 3/8 in. long, wire lead type	Voltage Divider
R22	N5905-192-7315	RESISTOR VARIABLE, CARBON ELEMENT, 500 ohms, 10% STD. A taper, 1/4 in. diam.	Voltage Adjust
R23A	N5905-279-3504	RESISTOR, FIXED, COMPOSITION, 4700 ohms, 5%, 1/2 watt, 3/8 in. long, wire lead type	Voltage Divider
R24		Same as R19	
R25	N5905-252-1953	RESISTOR, FIXED, COMPOSITION, 10 ohms, 10%, 2 watt, 11/16 in. long, wire lead type	Voltage Dropping
R26	N5905-279-1745	RESISTOR, FIXED, COMPOSITION, 15 ohms ± 10%, 1 watt, insulated body, wire lead type	Voltage Dropping
R27A	N5905-279-1885	RESISTOR, FIXED, COMPOSITION, 36 ohms, 5%, 1 watt, insulated body, wire lead type	Shunt
RTA		ELECTRON TUBE, ballast tube, 2HT4	Current Regulator

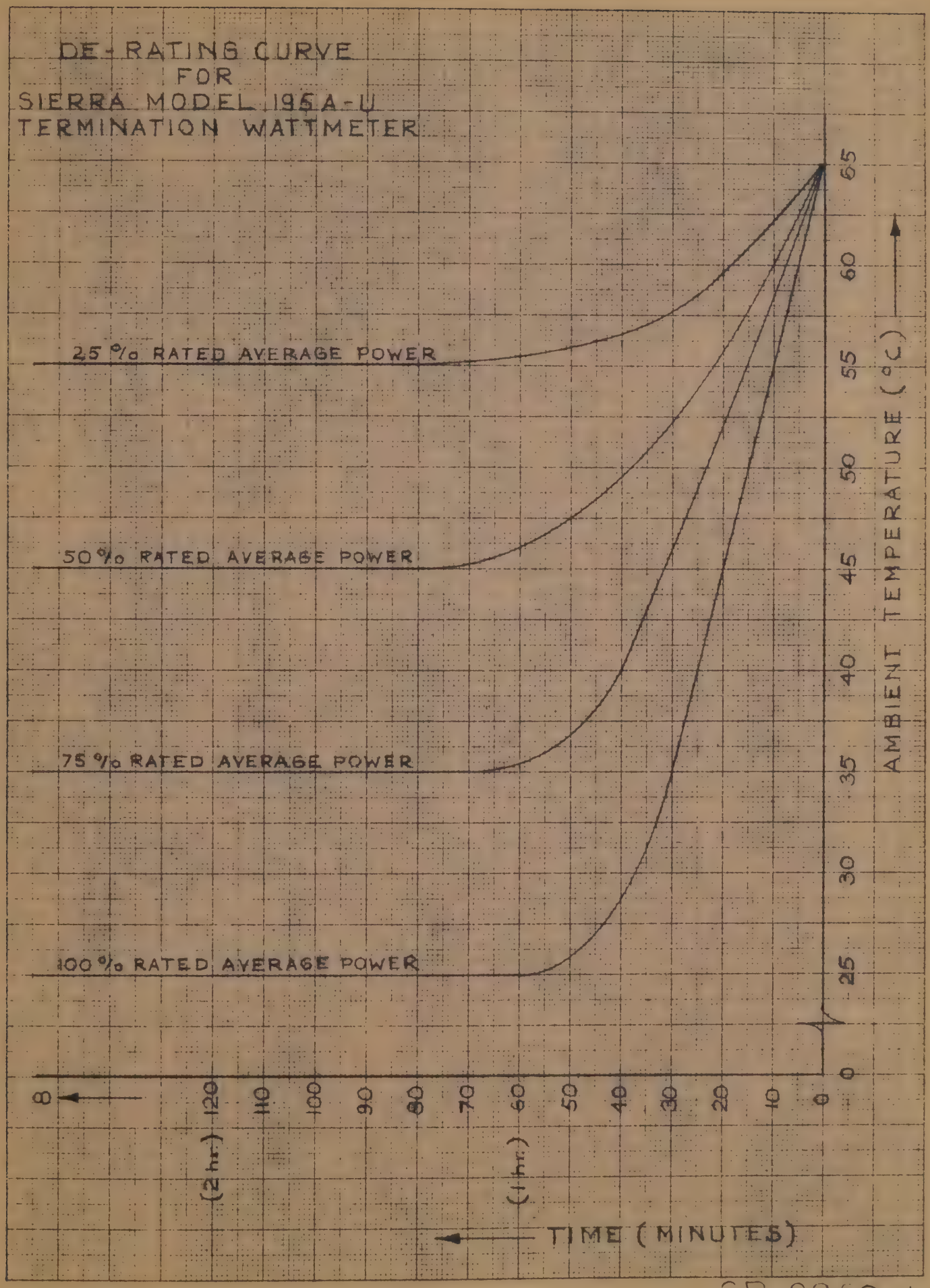
REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS, NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTIONS
S1	N5930-519-4042	SWITCH, ROTARY, SINGLE POLE, 3 position, 1 section, Phenolic insulation, 1-5/16 in. long, 1-1/4 in. wide.	Selector
T1	N5950-519-8792	TRANSFORMER, POWER, PRIMARY 117V single phase, 50/60 cps, SEC #1, 275V @ 30 ma, SEC #2 13V @ .3 amp, SEC #3 6.3V @ 1.2 amp, half shell metal case	Power Transformer
V1		ELECTRON TUBE, twin triode, 12AU7, Glass Envelope	Differential Amplifier
V2		Same as V1	
V3		ELECTRON TUBE, diode, UHF pencil type, 6173, glass envelope	Rectifier
V4		ELECTRON TUBE, voltage regulator, OB2, glass envelope	Voltage Regulator
XF1		FUSE, HOLDER, EXTRACTOR post type, plastic case, maximum rating 250V 20 amp 2.09 in. long, 1/2 in. wide	AC Line
XI1	N6210-553-1518	LIGHT, indicator, See I1	See Part I1
XRT1			
Shield	N5960-262-0015	SHIELD, ELECTRON TUBE	
Socket	N5935-333-6186	SOCKET, ELECTRON TUBE, miniature 7 pin, molded construction 3/4 in. high 5/8 in. diam.	1HTY and X4
XV1 and XV2	N5935-232-3719 N5960-270-5512	SOCKET, ELECTRON TUBE, 9 pin miniature with shield base and shield, molded construction 3/4 in high, 3/4 in diam, 1-1/8 in mounting centers	V1 and V2
XV3	N5935-258-8865	SOCKET, ELECTRON, TUBE, 2 pin, no shield provisions, molded construction, 1/2 in. high including terminals 1/4 inch dia, 1/2 inch long	V3
XV4		Same as XRT1	

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS, NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTIONS
Part No.			
1	Assemble from Component parts	CABLE, power, electrical power cord, two conductor with copper braid, No. 18 A.W.G.	AC Line
2.	Assemble from Component parts	CABLE ASSEMBLY, special purpose electrical, 3 conductors, two feet in length	Main Chassis
3.	Shop Manufacture	TERMINAL BOARD, 3 terminal double screw type, 2-1/16 in. long 3/4 in. wide	Main Chassis
4.	Low Failure Item-- See page 16	HERMETIC SEALED HEADER, flat disc shape, 3 sealed terminals, 1500 volt rating, .343 in. diam.	CAP, Electrical
5.	Shop Manufacture	TERMINAL BOARD, bakelite, 3 solder tab terminals, 1-1/2 in. long 1/4 in. wide	Main Chassis
6.	Shop Manufacture	TERMINAL BOARD, BAKELITE, six solder tab terminals, 1-1/2 in. long, 1/4 in. wide	Main Chassis
7.	Shop Manufacture	TERMINALBOARD, BAKELITE, 8 solder tab terminals, 2 in. long, 3/8 in. wide	Main Chassis
8.	Low Failure Item -- See page 16	KNOB, (QUAN. 2), set screw type, black plastic, with skirt, 7/16 in. long, 3/4 in. overall diam.	Front panel
9.	For Reference Only	CASTING, MAIN BODY, ALUMINUM alloy No. 356, 28 cooling fins, 15 in. long, 5-5/16 in. wide, 7-15/16 in. high, tapered hole through body	Main Body
10.	For Reference Only	ELECTRICAL METER SUBASSEMBLY, overall dimensions, 5.68 in. long, 4-21/32 in. diam., 6 mounting holes, cast aluminum	Rear of Main Body

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS, NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTIONS
11.	For Reference Only	LINE SECTION, radio frequency, 10.374 in. long copper cone, 56, 3/16 in. dia holes on large end to permit flow of dielectric coolant	Center of Main Body
12.	For Reference Only	CONTACT, ELECTRICAL, part of R1, nickel plated brass, 5.995 in. long tapered from .85 in dia one end to .06 in dia at opposite end	End of R1
13.	Low Failure item -- See page 16	CASTING, FRONT COVER, aluminum alloy, sand blasted finish, 6 inch high, 5 inch wide, 2-13/16 inch long at base	Front Panel
14.	Low Failure item -- See page 16	COVER, WATTMETER, CAST ALUMINUM, 1-3/32 in. long, 5 in. wide, 5 in. high, two keyholes 7/16 in. dia with 1/4 in. dia. key slots	Rear of Wattmeter Assembly
15.	Low Failure Item -- See page 16	COVER, WATTMETER, 22 GA perforated steel, 3-1/8 in. long, 4-29/32 in. wide, 5-23/32 in high	Top and Sides of Wattmeter Assembly
16	For Reference Only	PACKING, preformed, "O" ring rubber, solid type, .139 in. wide	Part of Part No. 10
17		Not Used	
18	For Reference Only	RING, RETAINER, TRU-ARC inside diam. .81 in.	Mounted in Part No. 30
19.	Low Failure Item -- See page 16	ASSEMBLY, wattmeter consisting of (1) plate front, (2) plate rear (3) Chassis (4) bracket, front anchor (5) bracket stiffener	Main Assembly of Wattmeter
20		Not Used	
21		Not Used	

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS, NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTIONS
22.		COOLANT, DIELECTRIC, 1.5 C.S viscosity, 497 c.c of coolant per unit. Dow-Corning 200 fluid	Inside Main Body
23.		Not Used	
24.	For Reference Only	PACKING, preformed, "O" ring, solid black rubber, circular form	Between Main Body and Rear Connector
25.	Shop Manufacture	ANGLE, aluminum alloy, 4-5/8 in. long, 1/2 in. high, 1/8 in. thick	Between Wattmeter and Main Body
26	For Reference Only	CAP, electrical material, brass, 1-13/32 in. long, 2-7/16 in. dia., 1-9/32 in. dia.	Inside one end of Main Body
27.		Not Used	
28.	For Reference Only	BUSHING, diode, material: brass, 1.187 in. long, .806 in. outside dia	Diode End of R1
29.	For Reference Only	RETAINER, DIODE, holder, material: brass, 1-25/64 in. long, .85 in. dia.	End R1 Opposite Part No. 12
30.	N6625-575-6138	CONTACT, electrical, resistor, material: brass, 3/8 in. long, .62 in. dia.	End of R1 Opposite Part No. 12
31.	Shop Manufacture	SUPPORT LUG, rear cover, material: brass, 13/16 in. long, 1/2 in. dia	Between Wattmeter Assembly and Main Body

REFERENCE DESIGNATION	STOCK NUMBERS SIGNAL CORPS, NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTIONS
32.	For Reference Only	ADAPTOR, meter, material: neoprene, 3-15/16 in. dia., 9/16 in. thick, used with 3 in. dia meter hold	Front of Meter M1
33.		Not Used	
34.		Not Used	
35.		Not Used	
36.		Not Used	
37.		Not Used	
38.		Not Used	
39.	Low Failure item -- See page 16	PACKING, preformed, "O" ring, solid black rubber, circular form, ring. 139 in. thick	Between Main Body and Part No. 26
40.		Not Used	
41.		Not Used	
42.	Low Failure item -- See page 16	CONNECTOR, RECEPTACLE, electrical HN type, rear of main body 1-1/32 in. long, 27/32 in. dia. with 3/4 20 N.E.F. thread	Rear of Main Body
NOTE:	For Items Referenced: LOW FAILURE ITEM-- if required requisition from ESO referencing NavShips 900, 180A		



SP-8962-1
8-19-57

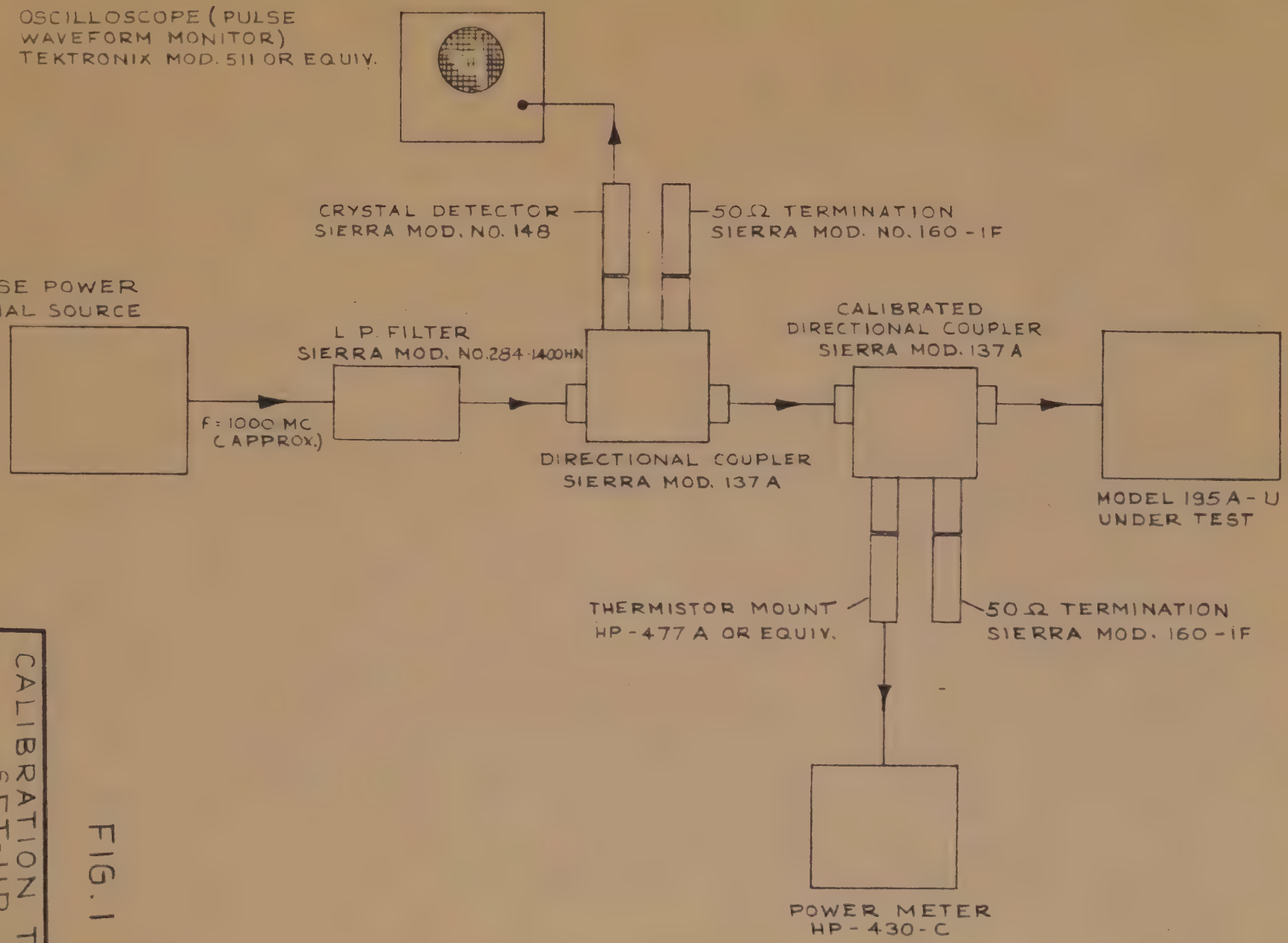
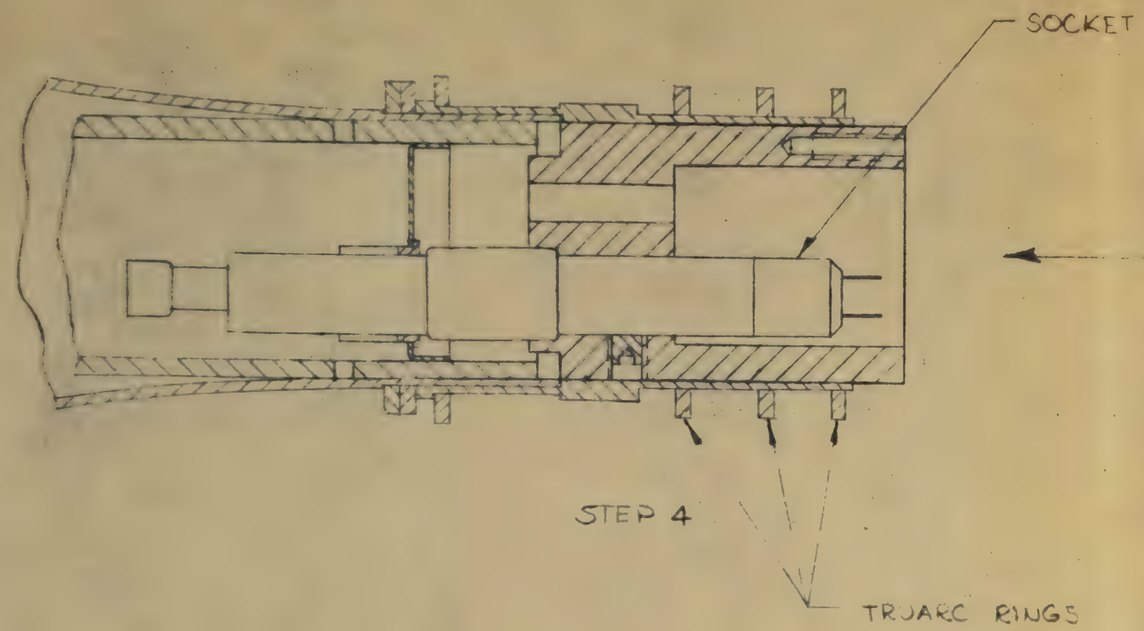


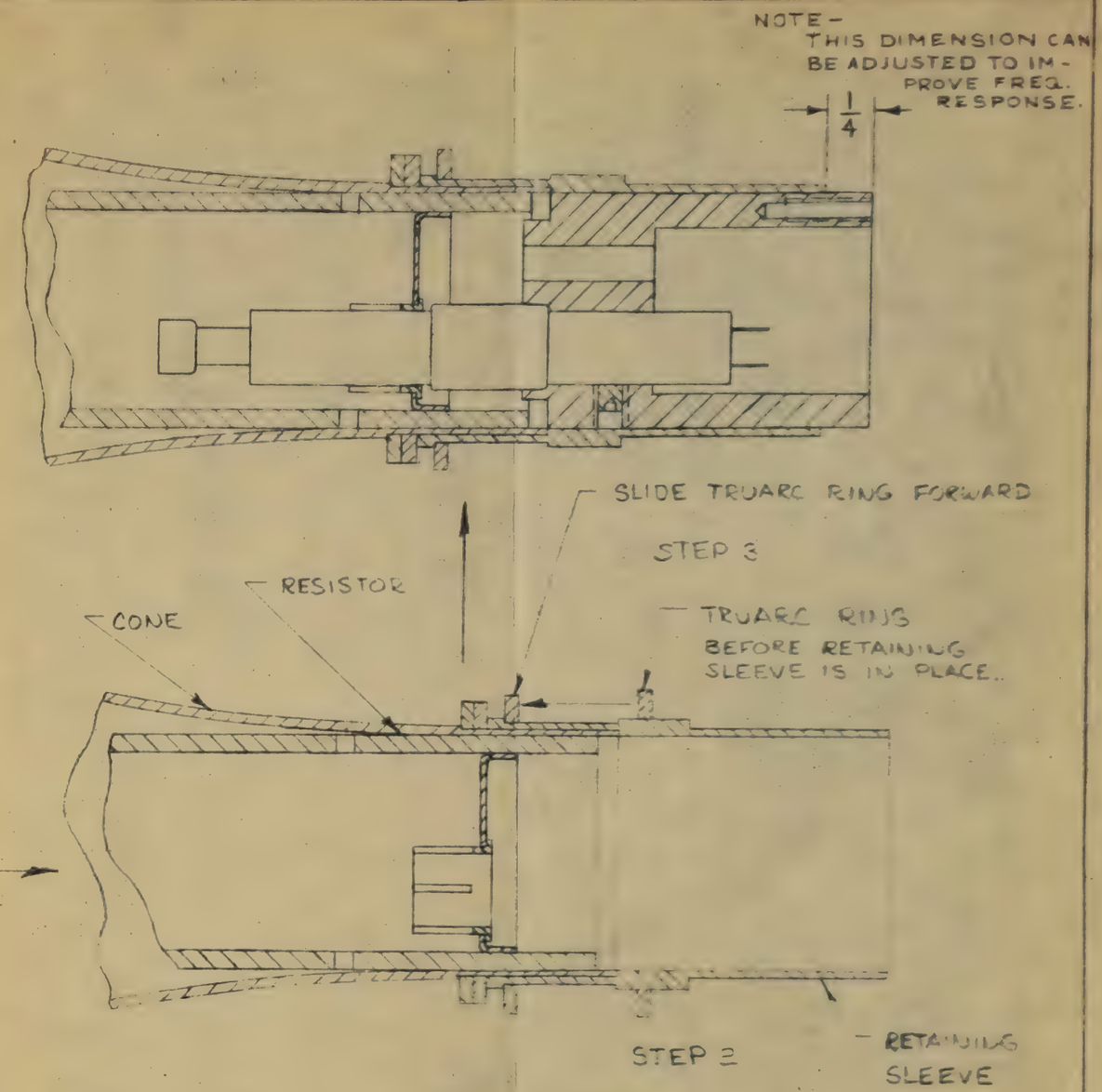
FIG. 1

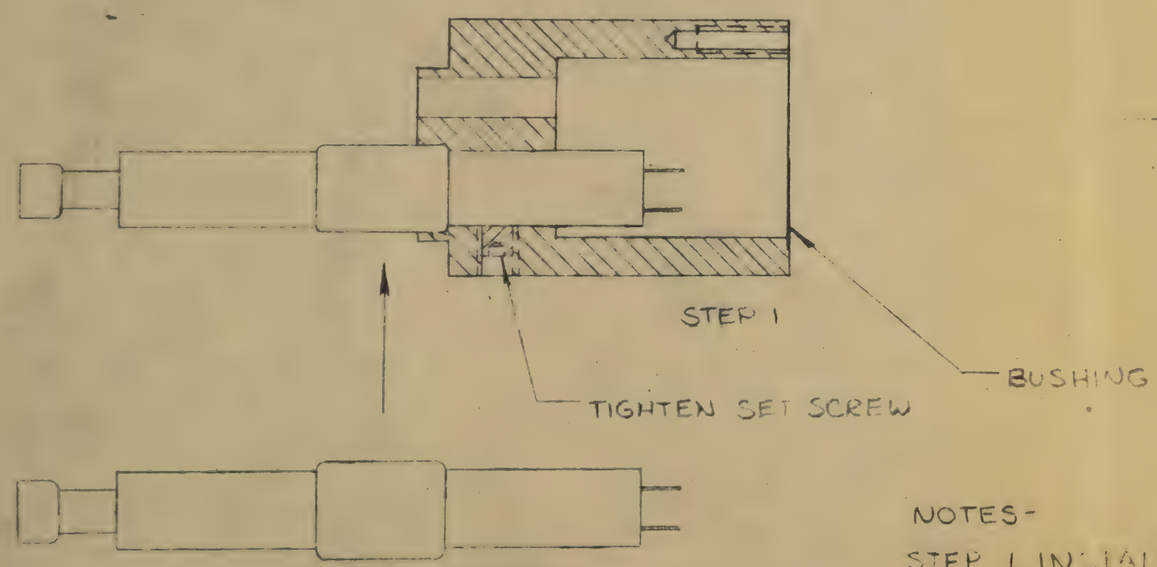
CALIBRATION TEST SET-UP

Sierra Electronic Corporation
SAN CARLOS, CALIFORNIA

DATE 3-5-58 | SK-9516-1







NOTES -

STEP 1 INSTALL BUSHING ON DIODE AND TIGHTEN SET SCREW

STEP 2 INSTALL RETAINING SLEEVE AND TRUARC RING AS SHOWN. THEN SLIDE TRUARC RING FORWARD.

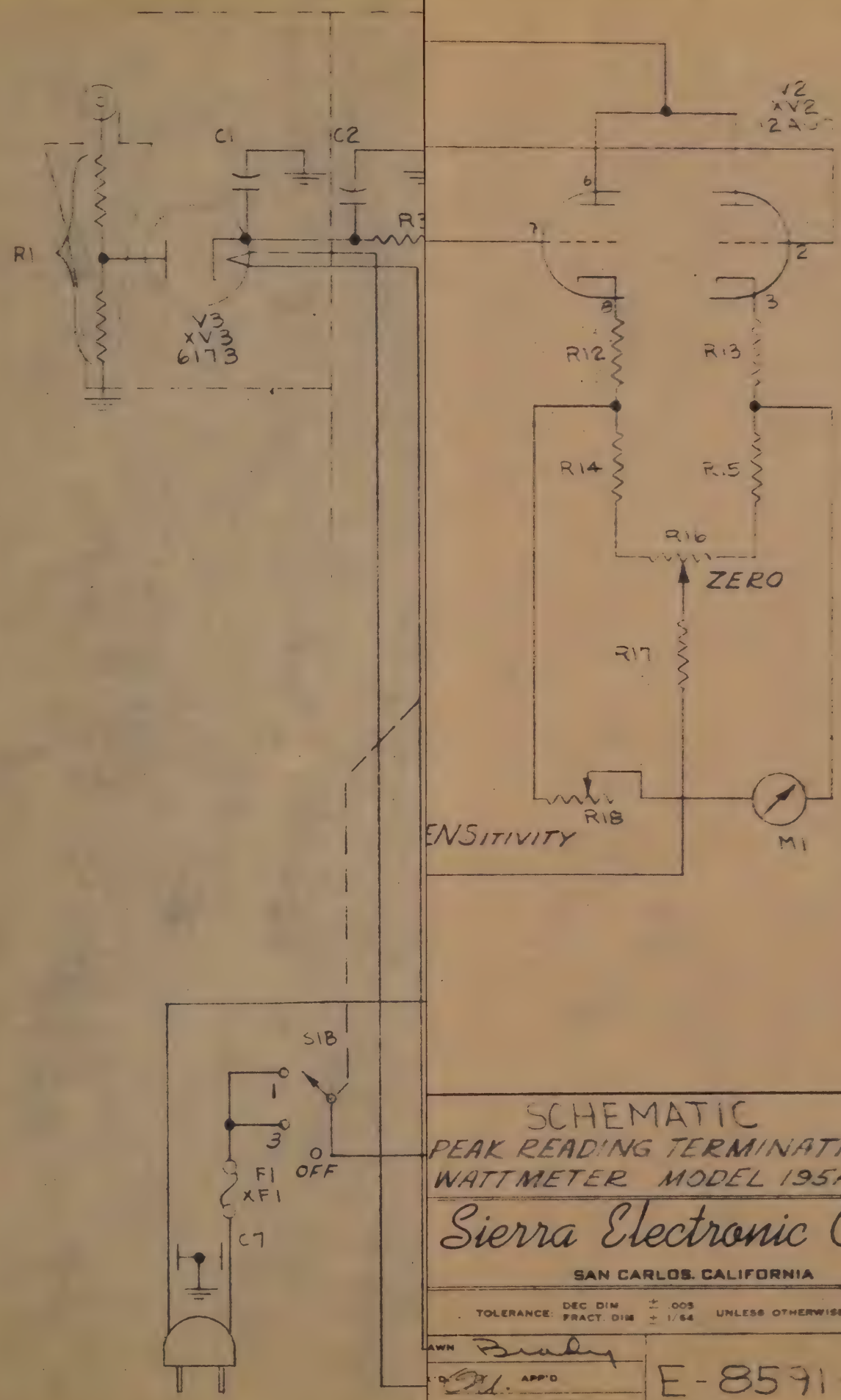
STEP 3 INSTALL BUSHING AND DIODE ASSEMBLY IN RETAINING SLEEVE AS SHOWN.

STEP 4 INSTALL 3 TRUARC RINGS AND SOCKET AS SHOWN.

ASSEMBLY - DIODE MOUNT
PEAK READING TERMINATION WATTMETER
MODEL 135A-U

Sierra Electronic Corp.
SAN CARLOS, CALIFORNIA

TOLERANCE DEC DIM ± .005 FRACT DIM ± 1/64 UNLESS OTHERWISE SPECIFIED		
DRAWN	SU-8672-2	ISSUE
CK'D. APP'D.		
DATE 4-25-57		
SCALE 2X	SHEET NO. OF	SHEETS



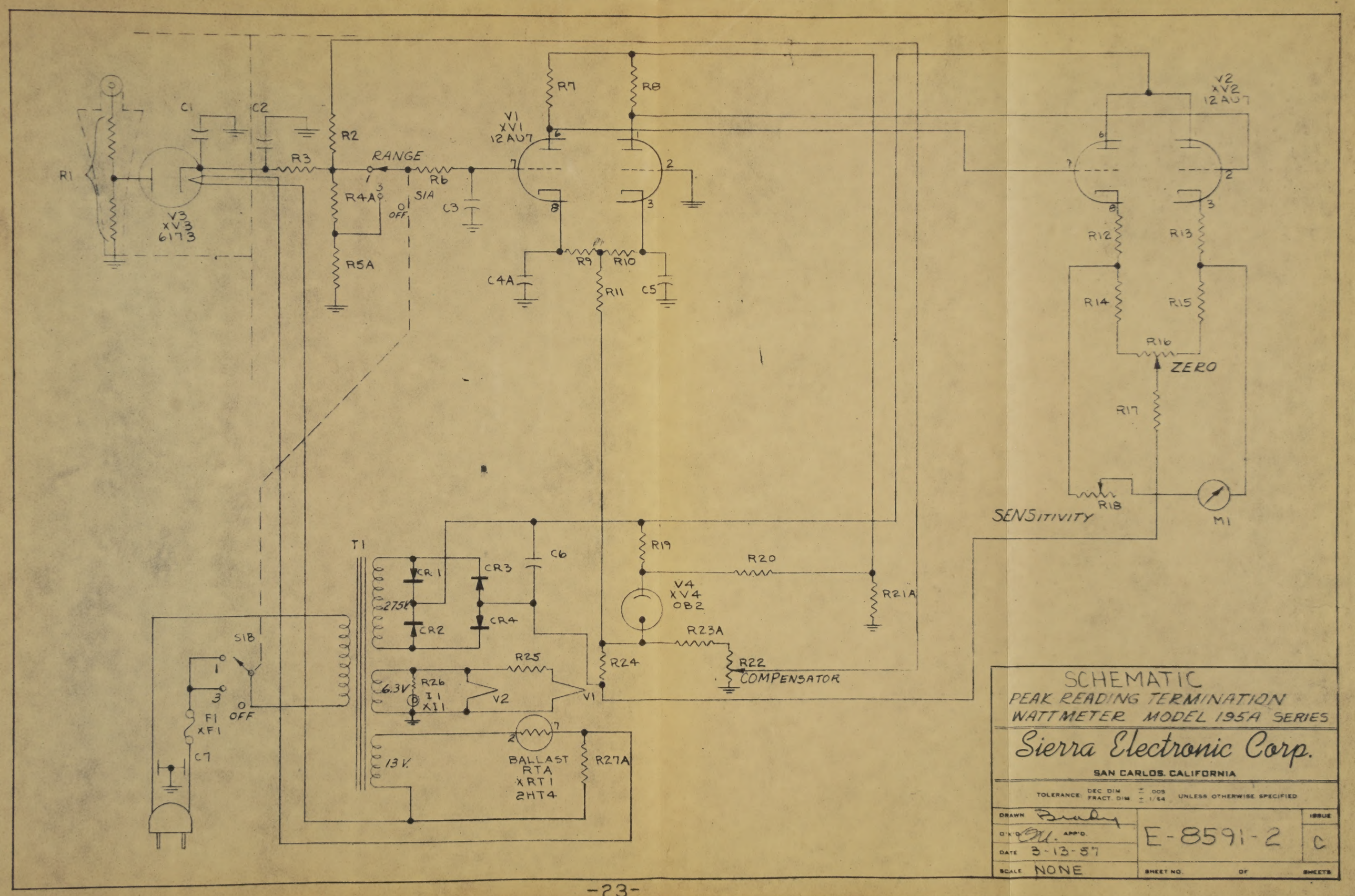
SCHEMATIC
PEAK READING TERMINATION
WATTMETER MODEL 195A SERIES

Sierra Electronic Corp.

SAN CARLOS, CALIFORNIA

TOLERANCE: DEC. DIM ± .005 FRACT. DIM ± 1/64 UNLESS OTHERWISE SPECIFIED

DRAWN Bradley	E-8591-2	ISSUE C
APP'D		
DATE 3-13-57		
SCALE NONE	SHEET NO. OF SHEETS	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C1
C2
V3
XV3
6173
R2
R3
RANGE
R4A
R5A
R6
S1A
OFF
C3
V1
XV1
12AU7
R7
R8
C4A
R9
R10
R11
C5
V2
XV2
12AU7
R12
R13
R14
R15
R16
ZERO
R17
R18
SENSITIVITY
M1
T1
CR1
CR2
CR3
CR4
C6
275V
6.3V
R26
I1
XI1
V2
R25
V1
13V.
BALLAST
RTA
XRT1
2HT4
R27A
R19
R20
V4
XV4
OB2
R21A
R23A
R22
COMPENSATOR
R24
S1B
OFF
F1
XF1
C7
SCHEMATIC
PEAK READING TERMINATION
WATTMETER MODEL 195A SERIES
Sierra Electronic Corp.
SAN CARLOS, CALIFORNIA
TOLERANCE: DEC. DIM ± .005 FRACT. DIM ± 1/64 UNLESS OTHERWISE SPECIFIED
DRAWN
O.K.'D APP'D.
DATE 3-13-57
SCALE NONE
E-8591-2
ISSUE C
SHEET NO. OF SHEETS